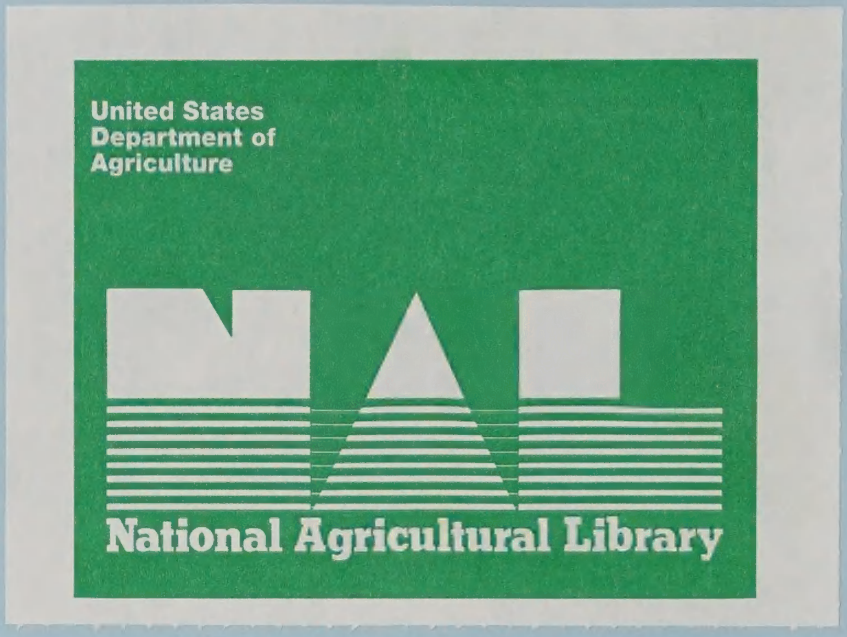
Sugar Beet Crop Germplasm Committee Meeting Minutes

February 28th, 2001

(in conjunction with the ASSBT Meeting)

Vancouver, B.C. Canada



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Minutes of the Sugar Beet CGC Meeting held Wednesday, February 28th, 2001 in conjunction with the ASSBT Meeting in Vancouver, B.C. Canada

Attending: Mark Bohning (USDA/ARS), JR Stander (Betaseed, Inc.), Roy Martens (Syngenta Seeds), Mitch McGrath (USDA/ARS), Lee Panella (USDA/ARS), Bob Lewellen (USDA/ARS), Larry Campbell (USDA/ARS), Shaoke Wang (Seedex, Inc.)

Excused: Joe Saunders (USDA/ARS), Irwin Goldman (University of Wisconsin), Carol Windels (University of Minnesota), Mark Law (Holly Hybrids)

Guests: Jan Debaene (Betaseed, Inc.), Bruce Fishburn (Syngenta Seeds)

1. **Membership Elections**
   Re-elected were Lee Panella for a two-year term as chairman (ending in 2003), and Bob Lewellen, Joe Saunders, JR Stander, and Shaoke Wang for four-year terms (ending in 2005). Irwin Goldman has decided not to run for reelection and the chairman was asked to put together a list of suitable candidates and distribute them to the membership for consideration. Current Membership list follows in Appendix 1.

2. **Sugar Beet CGC Coordinated Evaluation Results** - See Appendix 2.
   The Sugar Beet CGC will submit a proposal to evaluate 30 PI accessions from the National Plant Germplasm System's *Beta* collection for the same descriptor's that were evaluated this past year.

3. **Status report on the *Beta* germplasm collection activities at the USDA, ARS, Western Regional Plant Introduction Station To the Sugarbeet Crop Germplasm Committee Curator: Dr. Alan Hodgdon, 2000**

This report is on the activity of the *Beta* germplasm collection at the Western Regional Plant Introduction Station (WRPIS), Pullman, WA. Fifty-four accessions were increased at WRPIS in 2000. Of these thirty-three were grown under greenhouse conditions. Six accessions that were grown under field conditions will have to be regrown. All of the increases were given combined ratings which included seed number and quality. Of the greenhouse increases, nineteen were good, ten were fair, and four were poor. Of twenty-one field increases, four were good, six were fair, and eleven were poor. Of the thirty-seven accessions started in 2000, three had zero germination. The *Beta* increase program has a carryover of fifty-five accessions, largely

due lack of complete flower induction. Flowering de-induction seems to occur when growth conditions, especially night temperatures, are too warm. This problem has been solved in some of the greenhouses where we can control the temperatures well. De-induction is a problem in the field increases of wild *Beta* accessions. We will continue to work on the de-induction problem.

Seventy-three accessions of *Beta* were germination tested in 2000. Forty-two of the tested lines were new (1999) seed. Only one of these had less than 50% viability, and fourteen accessions had greater than 50% dormancy. There is a large backlog of *Beta* accessions that need germination testing so that better decisions can be made for seed increase priorities. Starting in 2001, WRPIS will double the output of germination tests. This should help greatly with the backlog of *Beta* germ tests.

A total of 420 beet accessions were distributed in 2000 in twenty-nine seed orders. Eight of the seed orders were for germplasm evaluation trials, with a total of 240 accessions in this group. Evaluation data for 1999 and 2000 has not yet been received by us. When we do get it, the data will be entered into GRIN. We also would like to request that any photos or electronic images of *Beta* accessions that researchers have be submitted for inclusion into GRIN if appropriate. We acquired 100 new accessions. One accession was backed up at NSSL.

In 2000, Dr. L. Frese visited WRPIS from Germany. We had discussions regarding the development of a *Beta* core collection, a future germplasm collection proposal to Greece, and toured the Pullman facilities. We also discussed problems related to seed regeneration with some of the more difficult accessions. We have developed an excellent working relationship with the IDBB in Europe.

In 2001 we plan to continue the seed increase program in both greenhouse and field plots. We have two experiments in progress to access protecting our over-wintering field plots. I am organizing characterization and evaluation data taken at Pullman from the last three years for entry into GRIN. Also, I am developing a Standard Operating Procedure for *Beta* germplasm maintenance at WRPIS.

4. **Revise Report on the Status of Beta Germplasm in the U.S.**, which was written in 1996 and is now outdated. We discussed this project and decided to work on this over the course of the year and will hopefully have completed the task by July 1, 2002.

5. **The question of whether the Sugarbeet CGC would be interested in incorporating molecular data into the GRIN database** was discussed and Lee Panella asked for a voice vote by the Sugarbeet CGC membership to recommend incorporating molecular data into GRIN. The vote was unanimous in favor of this. Further discussion of the potential for incorporating molecular data into GRIN system for *Beta* accessions took place by interested parties at a database meeting held on Thursday (March 1st) evening. Some members of the Sugarbeet CGC and other researchers present for the ASSBT Meeting met with Mark Bohning of the National Germplasm Resources Laboratory and developed an outline of what type of data they would like to see incorporated and the beginning plan of action. Since then, Dr. Alan Stoner has offered

to work with the sugar beet community to put molecular data into the GRIN system for easy online Internet access (http://www.ars-grin.gov/npgs). RAPD data developed in a study by Mitch McGrath is currently posted on GRIN. [McGrath,JM; Derrico,CA; Yu,Y (1999): Genetic diversity in selected, historical US sugarbeet germplasm and *Beta vulgaris* ssp. *maritima*. Theor. Appl. Genet. 98, 968-976.] Please take a look at any of the PIs used in that study and see how this has been done. We are interested in any feedback. Please address the feed back to Lee Panella or Mitch McGrath in East Lansing (see appendix 1 with list of contact information for Sugarbeet CGC members).

6. **There is some interest in a collection trip to survey *Beta nana* sites in Greece** to either be collected or work with the Greek Genebank for in situ conservation. Other areas of interest for collection trips include Iran and Iraq, both of which are politically unstable for official U.S. plant exploration trips.

7. **Mark Bohning gave a brief report of the ARS CGC Chairpersons meeting** held in Beltsville, MD July 19 - 20, 2001. The agenda is included in Appendix 3 as is the presentation by Dr. Allan Stoner on the part that Crop Germplasm Committees play in the USDA-ARS National Plant Germplasm System.

8. **Report on *Beta* core collection meeting in Cappelle-en-Pévèle, France** sponsored by the steering committee of the European Cooperative Programme for Crop Genetic Resources Networks (ECP\GR) through IPGRI. An executive summary follows and the full report can be accessed at http://www.ecpgr.cgiar.org/Publications/IBCCRep.pdf If you wish a hard copy, please contact Lee Panella.

Report on an
ECP/GR meeting of a task force on a Beta core collection

held at Cappelle-en-Pévèle (France)
on 30 September, 2000

Executive Summary

This report is divided into two major themes, the **development** and the **management** of the planned core collection.

DEVELOPMENT OF THE PLANNED CORE COLLECTION

1. **Reports on five *Beta* core collections exist.**
   a. Synthetic *Beta* Core Collection developed for evaluation purposes
   b. USDA/ARS *Beta* core collection
   c. *Beta* core collection of the VIR at Saint Petersburg
   d. *Beta* core collection of the Greek Gene Bank
   e. The Plant Genetic Resources Institute of AARI (Turkey)

2. **Rational of an International *Beta* Core Collection was reviewed**

Recommendation: An 'International *Beta* Core Collection' (IBCC) be developed.

3. **Definition of the domain of an IBCC**

Recommendation: Section Beta should be the priority domain of the IBCC. (This does exclude the development of a small core collection of sections Corollinae, Nanae and Procumbentes for research purposes.)

4. **Improvement of existing core collections**
   a. Use of characterisation and evaluation data
   b. Use of molecular marker data
   c. Use of pedigree data
   d. Use of curators knowledge

Recommendation: IBCC should not be developed from scratch but the SBCC used as a starting point. There should be a stepwise improvement as more characterisation, evaluation and molecular marker data become available.

Recommendation: Improvement of the core collection be considered a dynamic process, which underscores the need for continued communication among curators and gene bank managers.

MANAGEMENT OF THE PLANNED CORE COLLECTION.

1. **Maintenance – it is crucial that the genebanks involved be willing to cooperate**

Recommendation: One of the first steps needs to be getting agreement from the curators of collections involved that they are willing and able to participate. If they are not, then duplicate samples can be obtained and maintained by one of the other participating genebanks

2. ***In situ* maintenance of a core collection entries of sections Corollinae, Nanae and Procumbentes**

Recommendation: To underline the importance and function of *in situ* management programmes, add a database module for *in situ* managed populations /.

Recommendation: Use official channels to approach the institutions, local communities, or persons involved in *in situ* management of *Beta* species or of sites sustaining *Beta* populations and involve them in this effort.

3. **Information management and access to IBCC entries – the IDBB and IBCC manager will function as an information and germplasm broker.**

4. **Duplication backup of IBCC**

   Recommendation: Backup the entire IBCC as a unit at two locations

RECOMMENDATIONS FOR FOLLOW-UP AND ASSIGNMENT OF TASKS

- Initiate discussion on *in situ* management programmes for sections Corollinae, Nanae and Procumbentes and organise supporting letters from IPGRI and the IIRB.
- Find a mechanism to help encourage users to return characterisation and evaluation data to national genebanks.
- Acquire data from national genebanks – exploit data to improve the IBCC.
- Provide national genebanks with the complete list of IBCC
- Inform curators of national Beta collections on the existence and function of the IBCC.
- Ask curators if they are prepared and able to maintain IBCC entries.
- Inform curators that the number of seed requests for IBCC entries may increase and make sure that the IBCC accessions are maintained using the best practices.
- Stress the importance of base and safety duplicate samples.

9. Reminder to send seed from new releases to Pullman. All ARS scientists who release sugarbeet germplasm are reminded that, if they have sufficient seed, 200 grams of seed should be sent to Pullman as well as the small sample that is sent to the NSSL for the original PI process. If there is not enough seed please send what you can to Pullman so that they are not using there limited resources to do seed increases on material that we may have sitting on the self.

Appendix 1
Membership List of the Sugarbeet CGC

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APPENDIX 2

USDA-ARS NPGS *BETA* PLANT INTRODUCTION EVALUATIONS 1999

Cooperative Evaluation of NPGS *Beta* Germplasm coordinated by the Sugar Beet CGC

Thirty accessions were evaluated in 1999. Funding was provided by a grant from the USDA-ARS National Plant Germplasm System (NPGS) and industry collaborators funded evaluations for curly top (BSDF) and agronomic and quality descriptors (Dr. Lee Tungland - Novartis). The diseases listed below have a serious impact on sugar beets grown in this country. The Sugar Beet Crop Germplasm Committee (CGC) coordinated the work of the cooperators listed below. The NPGS *Beta* Collection was transferred to the Western Regional Plant Introduction Station (W-6) at Pullman, WA in 1995, and the Sugar Beet CGC has been working closely with the station personnel to assure that data are quickly entered into the GRIN database. Results from all of the tests have been forwarded to Pullman for entry into GRIN. They can be accessed using the Internet at the following URL: http://www.ars-grin.gov/npgs

Evaluator	Location	Descriptor
Lee Tungland	Longmont, CO	Agronomic
C. Rush	Bushland, TX	Aphanomyces
L. Panella	Fort Collins, CO	Cercospora
BSDF	Twin Falls, ID	curly top virus
C. Rush	Bushland, TX	Fusarium
R. Lewellen	Salinas, CA	Morphological
S. Hafez	Parma, ID	Nematode
L. Panella	Fort Collins, CO	Rhizoctonia
R. Lewellen	Salinas, CA	Rhizomania
M. Boetel	Fargo, ND	Root Maggot
J. Michels	Bushland, TX	Root Aphids
R. Lewellen	Salinas, CA	yellowing viruses

Agronomic and Quality Evaluations
Lee Tungland, Hilleshog Mono-hy Inc.
Novartis Seeds

The following descriptors were evaluated in Longmont, CO in field trials run by Hilleshog Mono-hy Inc.

NITSUCROSE – Nitrogen-sucrose - α-Amino-Nitrogen measured as milliequivalents per 100 grams of sucrose.

POTSUCROSE) – Potassium-sucrose - Potassium content measured as milliequivalents per 100 grams of sucrose.

SODSUCROSE – Sodium-sucrose - Sodium content measured as milliequivalents per 100 grams of sucrose.

SUCROSE – Sucrose - Sucrose content (percent of fresh weight).

SUGARCHK – Sugar check percent - Sugar content of roots - percent of check (measured as a percentage of fresh weight and expressed as a percent of the check variety).

NITROGENCH – α-Amino-Nitrogen Check Percent - Percentage difference between the a-Amino-nitrogen content of the accession (mg per liter) and a locally adapted sugarbeet hybrid grown and harvested under the same conditions as the accessions being evaluated.

SODIUMCH – Sodium Check Percent - Percentage difference between the sodium content of the accession (mg per liter) and a locally adapted sugarbeet hybrid grown and harvested under the same conditions as the accessions being evaluated.

POTASSCH – Potassium Check Percent - Percentage difference between the potassium content of the accession (mg per liter) and a locally adapted sugarbeet hybrid grown and harvested under the same conditions as the accessions being evaluated.

GROSSSUGAR – Gross sugar - Gross sugar production in kg/ha.

YIELD – Yield - Root yield in t/ha.

RECOVERSUG – Recoverable sugar - Total percent of recoverable sugar.

WHITESUGAR – White sugar yield - white sugar yield in kg/ha.

Hilleshog Mono-hy Inc.

Accession	WSYTH T/ha	WHITESUGAR kg/ha	SYTH T/ha	GROSSSUGAR kg/ha	RECOVERSUG WSCP %	SUCROSE SCP %	SUGARCHK %
AMES 2631	1.6	1451.2	3	2721	6.2	11.9	93
AMES 2634	1.3	1179.1	2.6	2358.2	5.9	11.7	91.4
AMES 2638	0.6	544.2	1.2	1088.4	5.5	11.1	86.7
AMES 2639	0.3	272.1	0.6	544.2	4.5	10.7	83.6
AMES 2640	0.4	362.8	0.7	634.9	5.8	11.5	89.8
AMES 2641	0.1	90.7	0.2	181.4	3.4	9.6	75.0
AMES 2642	0.3	272.1	0.8	725.6	3.4	10.3	80.5
AMES 2645	1.1	997.7	1.9	1723.3	6.5	11.6	90.6
AMES 2652	1.2	1088.4	2.3	2086.1	5.9	11.9	93.0
AMES 8300	0.1	90.7	0.3	272.1	5.4	10.7	83.6
PI142810	0.9	816.3	2.1	1904.7	5.0	10.9	85.2
PI169020	0.1	90.7	0.7	634.9	1.7	8.4	65.6
PI171507	0.1	90.7	1.0	907	0.6	7.7	60.2
PI172734	0.2	181.4	1.7	1541.9	1	7.0	54.7
PI193458	0.2	181.4	0.7	634.9	1.3	6.2	48.4
PI269308	0.1	90.7	0.1	90.7	5.1	10.1	78.9
PI379097	0.2	181.4	1.3	1179.1	0.9	6.7	52.3
PI486357	0.6	544.2	2.1	1904.7	2.8	10.0	78.1
PI604031	0.3	272.1	0.5	453.5	8.5	12.3	96.1
NSL93284	0.7	634.9	2.3	2086.1	2.8	9.3	72.7
NSL95218	0.4	362.8	1.8	1632.6	2.2	9.2	71.9
PI507851	0.5	453.5	1.3	1179.1	4.0	10.6	82.8
PI590763	0.8	725.6	1.5	1360.5	6.5	11.8	92.2
PI590766	1.6	1451.2	3.3	2993.1	5.7	11.4	89.1
PI596528	0.3	272.1	1.6	1451.2	1.8	9.3	72.7
HM9155	5.2	4716.4	7.8	7074.6	8.5	12.8	100.0

*PI215577 - annual so no roots could be harvested

Hilleshog Mono-hy Inc.

Accession	YIELD Root Yield t/ha	POTSUCROSE K100/SC	POTASSCH	SODSUCROSE NA100/SC	SODIUMCH	NITSUCROSE NITROGEN	NITROGENCH
AMES 2631	25.3	44.7	99.6	83.9	203.6	16.2	112.5
AMES 2634	22.1	44.8	99.8	84.6	205.3	22.6	156.9
AMES 2638	10.9	46.0	102.4	87.7	212.9	23.0	159.7
AMES 2639	5.8	54.6	121.6	98.8	239.8	28.7	199.3
AMES 2640	6.1	55.8	124.3	73.2	177.7	24.6	170.8
AMES 2641	1.9	61.1	136.1	109.6	266.0	26.9	186.8
AMES 2642	7.6	63.6	141.6	114.3	277.4	29.5	204.9
AMES 2645	16.2	43.4	96.7	71.9	174.5	20.2	140.3
AMES 2652	19.7	58.0	129.2	75.9	184.2	22.6	156.9
AMES 8300	2.7	53.7	119.6	78.2	189.8	18.7	129.9
PI142810	18.9	48.1	107.1	91.0	220.9	42.6	295.8
PI169020	8.1	61.8	137.6	151.4	367.5	39.3	272.9
PI171507	12.8	73.8	164.4	176.2	427.7	26.4	183.3
PI172734	23.7	83.2	185.3	225.1	546.4	40.1	278.5
PI193458	11.8	96.7	215.4	227.6	552.4	48.6	337.5
PI269308	1.2	61.3	136.5	64.5	156.6	30.2	209.7
PI379097	19.1	96.4	214.7	209.0	507.3	45.7	317.4
PI486357	21.1	53.8	119.8	138.8	336.9	29.4	204.2
PI604031	3.7	40.6	90.4	37.3	90.5	20.3	141.0
NSL93284	24.3	69.2	154.1	119.6	290.3	20.2	140.3
NSL95218	19.6	66.2	147.4	136.8	332.0	32.0	222.2
PI507851	12.6	62.3	138.8	100.3	243.4	39.5	274.3
PI590763	12.9	35.4	78.8	80.8	196.1	27.2	188.9
PI590766	29.1	48.6	108.2	82.6	200.5	32.3	224.3
PI596528	17.6	63.9	142.3	154.9	376.0	23.8	165.3
HM9155	64.5	44.9	100	41.2	100.0	14.4	100.0

*PI215577 - annual so no roots could be harvested

1999 CGC Evaluations of NPGS PIs for Resistance to *Cercospora beticola*

L. Panella
USDA-ARS Sugar Beet Research Unit, Fort Collin, CO

The breeding program in Fort Collins has created an artificial epiphytotic through inoculation with *Cercospora beticola* annually for over forty years to evaluate and select for resistance to leaf spot caused by this pathogen. We have been pleased to participate and lead this cooperative research project between the ARS, Colorado State University, and the BSDF. The project primarily involved field studies conducted on 35 acres of leased land near Windsor, CO.

Differences among lines were highly significant in all tests at each of three evaluation dates. There were three replications in each test, which were arranged in randomized complete block designs. Two-row plots were 12 feet long, with 22-inch row spacing and an 8 - to 10-inch within-row plant spacing. The trial was planted on April 20th in Windsor, CO. Inoculation was performed on June 30th and again on July 7th. Evaluations were made on September 7th, 14th, and 22nd, with the peak of the epidemic occurring on or about the last date. The field was sprayed twice with Betamix Progress, Upbeet, and Stinger (May 14th and 24th) to control weeds. The field was thinned by hand and irrigated as necessary.

We had good spring rain in 1999 and emergence was excellent and we got off to an early start. The 1999 leaf spot epidemic started strong and progressed rather slowly, but eventually became more severe by late August. We had a period between of about one month right after inoculation, in which we had relatively high evening temperatures, which helped disease development, however by September or evening temperatures had dropped. At our third evaluation, means of the resistant and susceptible internal controls were 3.1 and 6.4 (scale of 0-10), respectively, across the nursery. In 1998 (September 8), these means were 3.2 and 5.3, respectively. Means of contributor lines on September 22 ranged from 2.7 to 9.0, compared with 2.5 to 8.0 in the milder epidemic of 1998.

Experiment 2A, 1999. Leaf Spot Evaluation of USDA-ARS Beta Collection PIs.

		Disease Index[1]		
Entry	**Identification**	**September 7th**	**September 14th**	**September 22nd**
	$LSD_{0.05}$	**1.97**	**1.75**	**1.53**
1351	**LSS [2] (931002)**	**4.5**	**6.5**	**7.0**
1352	**LSR [3] (821051H2)**	**2.3**	**2.5**	**3.5**
1321	Ames 2631	3.5	4.5	5.8
1322	Ames 2634	3.8	5.0	5.0
1323	Ames 2638	3.8	5.3	6.3
1324	Ames 2639	3.5	4.3	4.8
1325	Ames 2640	3.3	4.0	4.5
1326	Ames 2641	3.8	4.0	4.8
1327	Ames 2642	6.0	6.0	6.8

Experiment 2A, 1999. Leaf Spot Evaluation of USDA-ARS Beta Collection PIs.

Entry	Identification	Disease Index[1] September 7th	September 14th	September 22nd
	$LSD_{0.05}$	**1.97**	**1.75**	**1.53**
1351	**LSS [2] (931002)**	**4.5**	**6.5**	**7.0**
1352	**LSR [3] (821051H2)**	**2.3**	**2.5**	**3.5**
1328	Ames 2645	5.0	6.5	7.5
1329	Ames 2652	4.0	5.3	6.3
1330	Ames 8300	5.0	5.3	6.5
1331	PI 379097	5.3	6.5	6.8
1332	PI 408965	4.5	5.3	6.3
1333	PI 486357	3.8	4.5	4.8
1334	PI 504171	4.5	5.5	5.8
1335	Ames 19156	5.0	5.8	6.3
1336	PI 504199	5.0	5.0	5.8
1337	PI 504206	6.5	9.0	9.0
1338	PI 518303	3.8	4.5	4.0
1339	PI 518320	2.8	3.8	4.5
1340	PI 540560	4.5	5.0	5.8
1341	PI 546508	9.0	9.0	9.0
1342	PI 546518	7.5	8.0	8.0
1343	PI 546520	8.0	8.0	8.0
1344	PI 604031	3.3	4.5	5.0
1345	NSSL 93284	3.5	4.5	5.3
1346	NSSL 95218	3.8	4.5	5.5
1347	PI 507851	5.0	5.3	5.5
1348	PI 590763	3.0	3.5	4.3
1349	PI 590766	3.5	3.3	4.3
1350	PI 596528	3.8	5.0	5.8
Trial Mean		**4.5**	**5.3**	**5.9**

[1]Disease Index is based on a scale of 0 (=healthy) to 10 (=dead).
[2]The Leafspot Susceptible Check is SP351069-0.
[3]The Leafspot Resistant Check is ((FC504CMS x FC502/2) x SP6322-0).

1999 CGC Evaluations of NPGS PIs for Resistance to curly top virus in the BSDF curly top nursery, Kimberly ID

L. Panella & Terry Brown
USDA-ARS, Fort Collin, CO & BSDF, Kimberly ID

Thirty accessions were evaluated for resistance to the beet curly top virus in an artificially inoculated nursery, managed by the Beet Sugar Development Foundation (BSDF) in Kimberly, ID. The field was planted on June 14 and 15. Planting was late to maximize the number of viruliferous leafhoppers available to transfer to the sugarbeets while they are in the 8- to 10-leaf stage. Plots were 12 ft long, two-rowed with 22 in between rows and replicated twice. After the beets emerged, plots were trimmed to 8 ft in length, thinned to one foot between beets, and cultivated. Viruliferous leafhoppers were released on July 22 to cause an artificial epiphytotic. One week before the leafhoppers were released in the nursery, they had been transferred onto curly top-infested beets to assure that they were viruliferous when placed in the field. Uniform infection was achieved by placing 530 small cages, each with 175 to 200 leaf hoppers, uniformly throughout the field for release, and then spreading the leafhoppers daily for the next week by dragging a 12-foot tarp across the field. The field was sprayed August 9 with parathion to kill black bean aphid (and not harm the leaf hoppers) and then with an insecticide on September 9 to kill the leafhoppers.

Plots were visually evaluated and rated on a Disease Index (DI) scale of 0 to 9 (no symptoms to dead) on August 31 and September 22. An analysis of variance (PROC ANOVA - SAS) on the disease indices (visual evaluation scores) determined that there were highly significant differences (P=0.05) among entries on both dates. Disease damage was minimal at the first rating and the evaluation of curly top virus damage was confounded by damage caused by the black bean aphid. Disease at the second rating was much more uniform, and these are the evaluation data entered into the USDA-ARS GRIN database. There were a few accessions that performed very poorly, with a DI of 6 or greater, however, there were also two accessions which were not significantly different from the resistant control. I would like to express my appreciation to the BSDF, which funded this research trial and to Mr. Terry Brown of the BSDF, who managed the nursery and helped with the evaluations. These data, and more information on the accessions evaluated, are available through the USDA-ARS GRIN database at http://www.ars-grin.gov/npgs.

			Disease Index*	
Entry	**Identification**	**Donor's ID**	**31 Aug**	**22 Sep**
		$LSD_{(0.05)}$	**1.38**	**1.52**
32	**911032**	**FC718 - Susceptible Check**	**4**	**6.3**
1	**94A068**	**Beta G6040 - Resistant Check**	**2.8**	**4**
2	Ames 8300	IDBBNR 9517	3.5	5
3	NSSL 93284	A77-16	4.3	6.3
4	NSSL 95218	A77-47	4.3	6.5
5	PI 116808	PALAG	4	6.8
6	PI 120690	IDBBNR 5177	4.5	6

Entry	Identification	Donor's ID	Disease Index* 31 Aug	22 Sep
		$LSD_{(0.05)}$	1.38	1.52
7	PI 120701	IDBBNR 5188	6	7
8	PI 142810	CHOGHONDAR	5.3	7.3
9	PI 164172	PALAK	4.8	7.8
10	PI 172730	IDBBNR 5292	5.8	7
11	PI 172734	KOCABAS	4.5	6.3
12	PI 173841	PALAG	4.3	6.5
13	PI 173843	PILAK	3.8	6
14	PI 174060	IDBBNR5311	5.3	7
15	PI 179176	IDBBNR 5348	5	5.8
16	PI 193458	IDBBNR 5372	4.5	7
17	PI 198413	WB 192B	6.8	7.3
18	PI 257280	IDBBNR 5561	4.5	6
19	PI 268365	LARB-LABORE	4	6
20	PI 271441	IDBBNR 5437	3.5	4.5
21	PI 277270	BANERJEE'S GIANT	3	5.3
22	PI 486357	Kubanskij P/g 9	4.8	6.5
23	PI 504171	Leaf beet	4	6.3
24	PI 504173	Leaf beet	6.3	7.8
25	PI 504185	Wild beet	3.3	4.8
26	PI 504199	Wild beet	4.3	6.5
27	PI 518303	IDBBNR 5797	3.8	5.8
28	PI 540560	WB 811	5	6.8
29	PI 546422	IDBBNR 5640	4	6
30	PI 546455	IDBBNR 4658	6.8	8
31	PI 546534	IDBBNR9701	6	7.5

*Disease Index (DI) scale = 0 (no symptoms) to 9 (plant death).

1999 CGC Evaluations of NPGS PI
Rhizomania, Virus Yellows and morphological Traits

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Notes:

PI's mostly easy bolting annuals and difficult to evaluate in the field. Early maturity. Plot infected with *Schlerotium rolfsii*, many plants rotted and plots affected.

End Use

1. Chard
2. DDR
3. DDR, Chard, spinach
4. Fodder
5. Sugar
6. Wild beet type
7. Mixed

Bolting Tendency without cold induction

1. BB (annual) 100% bolting
2. bb (biennial) 0%
3. B:bb (mixed) 1 - 99%

Rhizomania – Percentage of resistance divided by total # of plants
Powdery Mildew – heavy, generalized infection, most plants susceptible

Evaluation of Plant Introduction (Pullman), 1999					
		End Use	Bolting	Rhizomania % resistance	Powdery Mildew
Checks					
1 US H11		5	2	19	S
2 97-SP22-0		5	2	33	S
3 Y869 (Iso)		5	2	73	S
4 Y875 (Iso)		5	2	80	S
5 R827		5	2	77	S
Beta vulgaris					
23 Ames 8300	IDBBNR 9517, UK	5	1	22	S
24 PI 116808	PALAG, India	6	1	63	S
25 PI 117115	IDBBNR 5170, Turkey	1	3	31	S
26 PI 120690	IDBBNR 5177, Turkey	5	1	33	S
27 PI 120701	IDBBNR 5188, Turkey	5	3	53	S
28 PI 142810	CHOGHONDAR, Iran	3	2	13	S
29 PI 164172	PALAK, India	5	1	46	S
30 PI 171507	KOCABAS, Turkey	3	3	13	S

Evaluation of Plant Introduction (Pullman), 1999						
			End Use	Bolting	Rhizomania % resistance	Powdery Mildew
31	PI 172734	KOCABAS, Turkey	1	2	25	S
32	PI 173841	PALAG, India	5	1	59	S
33	PI 174060	IDBBNR 5311	1	1	20	S
34	PI 179176	IDBBNR 5348	5	1	20	S
35	PI 193458	IDBBNR 5372	2	2	7	S
36	PI 215577	IDBBNR 5381	5	1	74	S
37	PI 268365	LARB-LABORE, Afghanistan	5	1	25	S
38	PI 269308	EGYPTISK PLATTRUN	2	2	0	S
39	PI 271441	IDBBNR 5437	5	1	67	S
40	PI 277270	BANERGEE'S GIANT	5	1	64	S
41	PI 379097	CRVENO, Mace	2	2	4	S
42	PI 408965	PUSA JYOTI, India	5	1	71	S
43	PI 486357	KUBANSKIJ P/g 9, SU	5	2	33	S
44	PI 504171	LEAF BEET	5	1	53	S
Beta vulgaris subsp. maritima						
45	Ames 19156	SD IDBBNR 9555, USSR	5	1	33	S
46	PI 504199	WILD BEET, Italy	6	1	32	S
47	PI 504206	WILD BEET, Italy	no growth			
48	PI 518303	IDBBNR 5797	5	2	77	S
49	PI 518320	IDBBNR 5814	5	3	66	S
50	PI 540560	WB 811	5	1	30	S
51	PI 546508	IDBBNR 9675, Gr	no growth			
52	PI 546518	IDBBNR 9685, Gr	no growth			
53	PI 546520	IDBBNR 9687, Gr	no growth			
54	PI 546534	IDBBNR 9701,Tunisia	5	1	44	S
Beta vulgaris subsp. vulgaris						
55	NSL 93284	A77-16, Chile	1	3	15	S
56	NSL 95218	A77-47, Chile	1	2	0	S
57	PI 507851	UDBBNR 5568	2	2	2	S
Beta vulgaris var. cicla						
58	PI 257280	IDBBNR 5561	1	1	14	S
Beta vulgaris var. macrocarpa						
59	PI 198413	WB 192B	no growth			
60	PI 546455	IDBBNR 4658	no growth			

1999 CGC Evaluations of NPGS PIs for Resistance to Sugar Beet Cyst Nematode

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EVALUATION OF THIRTY SUGAR BEET (*Beta vulgaris*) PI ACCESSIONS FOR RESISTANCE TO BEET CYST NEMATODE (*Heterodera schachtii*), 1999: Sugar beet seeds were planted 03 May in the greenhouse in 500 cm^3 pots containing naturally infested beet cyst nematode soil (4.3 eggs and larvae per 1 cm^3 soil). Thirty PI accessions were compared to the susceptible check, HM WSPM9. Experimental design was randomized block with six replications. Sugar beet seedlings were separated from soil ten weeks after planting (13 Jul). Beet cyst nematode females and cysts were enumerated from the roots and soil. An analysis of variance was performed on the data, and mean separation was computed using the least significant difference. A numeric score of 0 to 9 was assigned to each PI accession (0 = immune, 9 = highly susceptible).

PI Accession	Beet Cyst Nematode (females & cyst count)						Score[1]
	Roots		Soil		Total		
PI 116808	22	cd	316	a	338	a	9
PI 546396	43	a	270	ab	313	ab	9
PI 179176	35	ab	248	abc	283	abc	9
PI 174060	16	cdefgh	260	ab	276	abc	9
PI 172734	18	cdefg	254	ab	272	abc	9
PI 172730	7	efghi	265	ab	272	abcd	9
PI 173841	8	defghi	244	abcd	252	abcde	9
PI 271441	19	cdef	225	abcde	244	abcdef	9
Ames 8300	24	bc	216	abcdef	240	abcdef	9
PI 173843	18	cdefg	210	abcdef	229	abcdefg	9
PI 164172	12	cdefghi	215	abcdef	227	abcdefg	9
PI 215577	20	cde	200	bcdef	220	bcdefg	9
PI 504173	19	cdef	200	bcdef	219	bcdefg	9
PI 120701	9	defghi	196	bcdefg	205	bcdefgh	9
PI 268365	12	cdefghi	193	bcdefg	205	bcdefgh	9
PI 193458	10	cdefghi	188	bcdefgh	198	bcdefghi	9
PI 120690	9	defghi	186	bcdefgh	195	cdefghi	9
HM WSPM9 (susceptible check)	12	cdefghi	182	bcdefgh	194	cdefghi	9
PI 169020	9	defghi	180	bcdefgh	189	cdefghi	9
PI 142810	6	fghi	171	bcdefgh	177	cdefghi	9
PI 277270	12	cdefghi	143	cdefghi	155	defghij	8
PI 486357	4	hi	142	cdefghi	146	efghij	7
PI 442069	7	efghi	139	cdefghi	146	efghij	7
NSL 93284	3	hi	138	defghi	141	efghij	7
PI 546534	8	efghi	132	efghi	140	efghij	7
NSL 95218	2	i	133	efghi	135	fghij	6
PI 504199	5	ghi	108	fghi	113	ghij	5
PI 257280	9	defghi	88	ghi	97	hij	4
PI 504180	6	fghi	79	hi	85	ij	4
PI 518303	1	i	55	i	56	j	2
PI 546455	0	i	50	i	50	j	2
LSD (0.05)	**14**		**110**		**117**		

[1] Score: 0 = immune, 9 = highly susceptible to beet cyst nematode.

1999 CGC Evaluations of NPGS PIs for Resistance to *Rhizoctonia solani*

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There were five replications in each test, which were arranged in randomized complete block designs. Rhizoctonia-resistant line FC703 and a highly susceptible check (FC901/C817) were included as internal controls, along with highly resistant FC705-1. One-row plots, planted May 20th, were 14 feet long with 22 inches between rows and 8-10 inches within-row spacing. Inoculation with dry, ground, barley-grain inoculum of *Rhizoctonia solani* isolate R-9 was performed on July 13th; immediately after inoculation, a cultivation was performed so as to throw soil into the beet crowns. The field was sprayed twice with Betamix Progress, Upbeet, and Stinger (June 2 and 12) to control weeds. The field was thinned by hand and irrigated as necessary. Beets were harvested August 23 through 27. Each root was rated for rot on a scale of 0 to 7 (dead) as previously described. ANOVAs were performed on disease indices (DIs), percent healthy roots (classes 0 and 1 combined), and percentage of roots in classes 0 thru 3. Percentages were transformed to arcsin-square roots to normalize the data for analyses ("AP 0-1" and "AP 0-3" in the accompanying table). Both percentages and arcsins are given in the table, and LSDs are provided for comparing arcsins of your entries with those of our internal checks.

We had unusually heavy spring rainfall before planting and were able to plant to moisture. We also had just a little rain in the week after planting with warming temperatures. Therefore, stands were excellent and the 1999 Rhizoctonia epidemic started strong and progressed quickly, becoming severe by mid August. Differences in DIs among entries in all tests were highly significant ($P < 0.001$). Mean DIs across all tests for highly resistant FC705-1, resistant FC703, and the highly susceptible check were 3.3, 3.9, and 6.2, respectively. Percentages of healthy roots were 17.8, 9.5, and 0.5 for these internal controls. Percentages of roots in disease classes 0 thru 3 were 56.3, 38.0, and 4.0, respectively. The highest and lowest DIs for evaluated lines were 6.8 and 2.0, respectively. This year, I also have enclosed a one year evaluation of most of the Rhizoctonia-resistant lines released from the USDA-ARS breeding project at Fort Collins. This is a test from 1999 under the same conditions as the other contributor lines in this year's test.

Experiment 2R, 1999. Rhizoctonia Resistance Evaluation of USDA-ARS NPGS *Beta* PIs, Windsor CO, (Lee Panella)

Seed Source	Origin	subspecies	Donor's ID	DI	% 0-1[1]	% 0-3[1]	AP 0-1[1]	AP 0-3[1]
			$LSD_{P=0.05}$	1.0			10.9	16.9
Ames 2631	United States	*vulgaris*	IDBBNR 4773	6.3	0	4	0	5
Ames 2652	United States	*vulgaris*	IDBBNR 4794	6.7	0	0	0	0
PI 277270	United States	*vulgaris*	Banerjee's Giant	6.6	0	6	0	7
PI 468357	Former Soviet Union	*vulgaris*	Kubanskij P/g 9	6.3	0	0	0	0
PI 504199	Italy	maritima	Wild beet	4.3	8	42	11	40

Experiment 2R, 1999. Rhizoctonia Resistance Evaluation of USDA-ARS NPGS *Beta* PIs, Windsor CO, (Lee Panella)								
Seed Source	**Origin**	**subspecies**	**Donor's ID**	**DI**	**% 0-1[1]**	**% 0-3[1]**	**AP 0-1[1]**	**AP 0-3[1]**
			$LSD_{P=0.05}$	**1.0**			**10.9**	**16.9**
PI 518320	United Kingdom	*maritima*	IDBBNR 5814	5.6	2	16	4	18
931017	Greece	*maritima*	IDBBNR 9687	7.0	0	0	0	0
PI 604031	Ireland	*maritima*	IDBBNR 3863	6.5	0	2	0	4
NSL 95218	Chile	*vulgaris*	A77-47	6.7	0	2	0	4
PI 268365	Afghanistan	*vulgaris*	Larb-Labore	5.4	2	22	4	25
Ames 2634	United States	*vulgaris*	IDBBNR 4776	6.1	0	0	0	0
Ames 2638	United States	*vulgaris*	IDBBNR 4780	6.5	2	2	4	4
Ames 8300	United Kingdom	*vulgaris*	IDBBNR 9517	5.4	0	18	0	20
Ames 19156	Former Soviet Union	*maritima*	IDBBNR 9555	5.8	6	16	11	18
NSL 93284	Chile	*vulgaris*	A77-16	5.5	2	12	4	13
PI 269308	Sweden	*vulgaris*	Egyptisk Plattrund	5.2	0	12	0	16
PI 271441	India	*vulgaris*	IDBBNR 5437	5.8	2	20	4	18
PI 379097	Macedonia	*vulgaris*	Crveno	5.2	0	6	0	7
PI 408965	India	*vulgaris*	Pusa Jyoti	6.5	0	8	0	11
PI 442069	Spain	*vulgaris*	IDBBNR 5504	5.9	0	12	0	16
PI 504171	Italy	*vulgaris*	Leaf beet	5.8	2	10	4	12
PI 504180	France	*maritima*	Wild beet	6.5	0	0	0	0
PI 504206	Italy	*maritima*	Wild beet	7.0	25	0	0	0
PI 507851	Hungary	vulgaris	IDBBNR 5568	5.0	8	20	10	20
PI 518303[2]	United Kingdom	*maritima*	IDBBNR 5797	5.5	25	25	-3	-3
PI 540560	France	*maritima*	WB 811	6.0	6	14	7	19
PI 546508	Greece	*maritima*	IDBBNR 9675	6.0	14	14	11	11
PI 546518	Greece	*maritima*	IDBBNR 9685	7.0	0	0	0	0
PI 590763	United States	*vulgaris*	IDBBNR 4587	6.0	2	6	4	9
596528	United States	*vulgaris*	RS-2B	5.0	10	20	16	26
931017	**United States**	**Susceptible Check - FC901/C817**		**6.5**	**0**	**2**	**0**	**4**
831083	**United States**	**FC705/1 - 'Highly Resistant Check**		**2.8**	**28**	**68**	**31**	**56**
751080H	**United States**	**FC703 - 'Resistant Check**		**4.2**	**16**	**30**	**18**	**32**

[1] DI = Disease Index on a scale of 0 (no damage) to 7 (plant death), % 0-1= percent healthy roots, % 0-3 those roots most likely to be harvested and taken to the factory. AP is the arcsin-square root transformation of percentages to normalize the data for analyses.

[2] PI 518303 was missing replication 4 and was not in the ANOVA done to generate the LSD. Therefore judgement of differences between this and the controls should not be made using the LSD.

[3] No arc sin-quare root transformations were generated.

1999 CGC Evaluations of NPGS PI for Resistance to Sugarbeet Root Aphid

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Materials and Methods

Each entry was replicated 20 times. Three seeds of each entry were planted in 4-inch square pots using a 2:1 topsoil: sand mix. After germination, each pot was reduced to one healthy plant. These plants were allowed to grow until they reached the four true leaf stage. Each pot was then infested with five sugarbeet root aphids. Aphids used for infesting the plants were taken from a bulk greenhouse culture reared *Chenopodium quinoa*. Potted, infested plants were arranged randomly in groups of three in flats with a row of empty pots separating each group of three. Greenhouse temperature was approximately 20°C and plants were manually watered as needed to keep the soil moist and prevent aphids from drowning before colonies established. Plants were allowed to grow undisturbed for six weeks.

After six weeks the infestations were evaluated. Plants that died from causes other than sugarbeet root aphid damage, before the evaluations were made, were not included in the analyses. Plants were removed from the pots, and the severity of the infestation was determined by floating aphids out of the root mass in 12 cm diameter x 8 cm deep bowls filled with water. Level of infestation was rated between 1-4 for each plant. Classifications are as follows: 1 - no nymphs or adults present; 2 - nymphs present, no adults present; 3 - nymphs present, few adults present; 4 - nymphs present, many adults present. Aphids were classified as adult using the presence of the sub-genital plate as an indicator of maturity.

Data were analyzed by analysis of variance and the Student-Newman-Keuls test was used to separate significantly different means (p=0.05). The results of the 1-4 rating system were converted to a 0-9 system for reporting purposes.

Results

The attached table and graph present the results of the evaluations for 1999. Only three entries, PI 486356, 'ACH 191', and 'ACH 205' differed significantly from the resistant 'Ranger" check. Since the two susceptible checks, 'ACH 191' and 'ACH 205', had significant damage ratings, we believe that sugarbeet root aphid pressure was sufficient for the experiment. However, variation was quite high, and may be due to disease problems noted in some entries. Two entries, PI 198415 and PI 546455 were not included in the statistical analyses because they seemed to be infected with a seed-borne pathogen, and the majority of the plants died before evaluations were made. Entries from NSL 95218 through PI 486357 will probably sustain damaging sugarbeet root aphid colonies. Entries from PI 172734 through PI 173841 may have resistance to the aphid since one would not expect these entries with a rating at or below 1 (on a 0-9 scale) to sustain sugarbeet root aphid colonies for long periods of time.

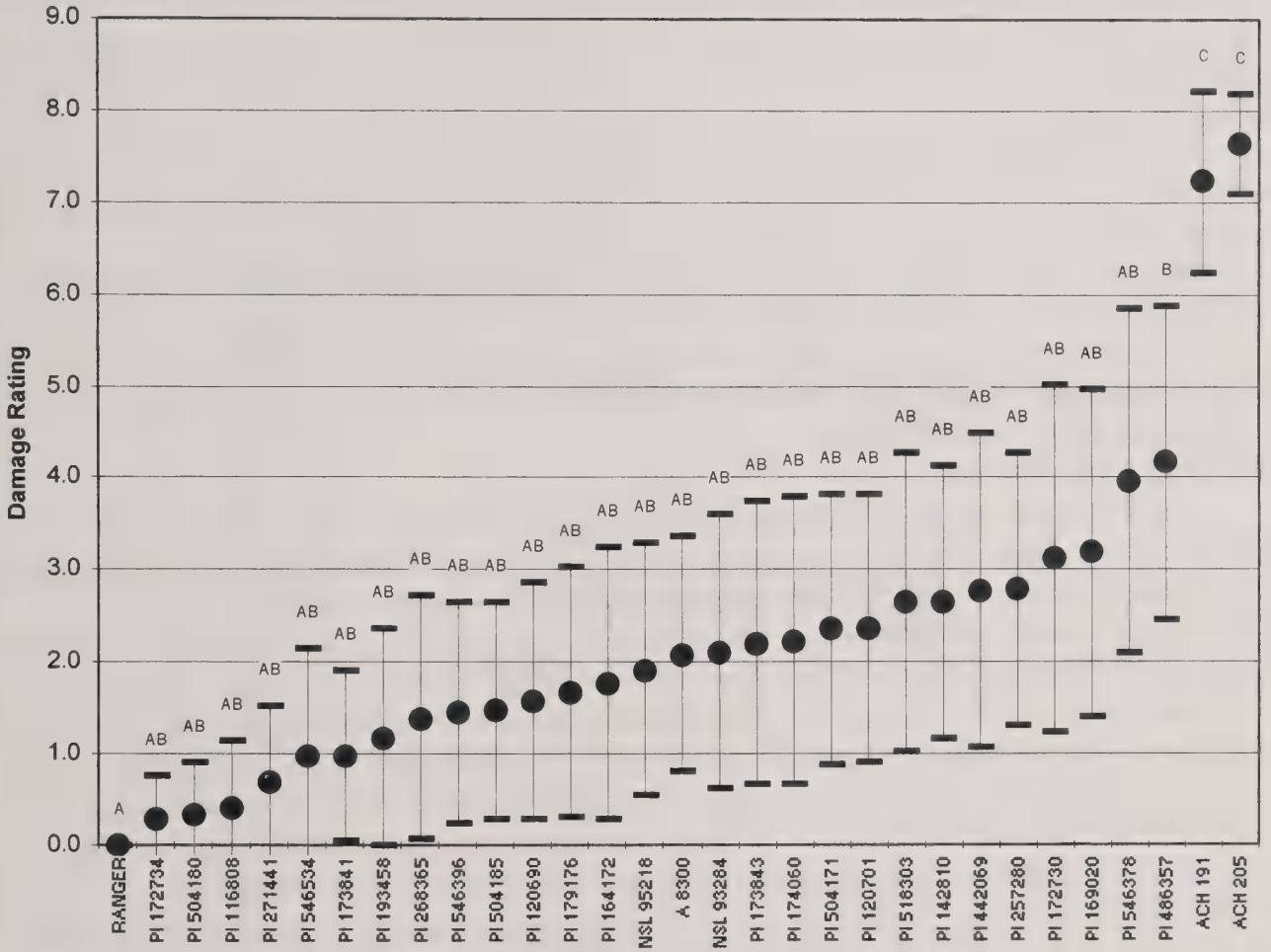
Table 1. Sugarbeet root aphid resistance evaluations for 1999 entries.

Entry	Average damage rating	Std. Error	n	Entry	Average damage rating	Std. Error	n
RANGER	0.00	0.00	19a[1]	PI 173843	2.21	0.88	17ab
PI 172734	0.28	0.28	18ab	PI 174060	2.22	0.90	18ab
PI 504180	0.33	0.33	15ab	PI 504171	2.35	0.84	17ab
PI 116808	0.42	0.42	18ab	PI 120701	2.36	0.84	18ab
PI 271441	0.69	0.49	18ab	PI 518303	2.64	0.94	18ab
PI 173841	0.97	0.54	18ab	PI 142810	2.65	0.84	18ab
PI 546534	0.97	0.67	18ab	PI 442069	2.78	0.99	17ab
PI 193458	1.18	0.68	17ab	PI 257280	2.79	0.85	16ab
PI 268365	1.39	0.76	18ab	PI 172730	3.13	1.08	16ab
PI 546396	1.45	0.70	19ab	PI 169020	3.19	1.03	18ab
PI 504185	1.47	0.68	17ab	PI 546378	3.97	1.07	17ab
PI 120690	1.58	0.75	19ab	PI 486357	4.17	0.99	18 b
PI 179176	1.67	0.78	18ab	ACH 191	7.22	0.57	18 c
PI 164172	1.76	0.85	17ab	ACH 205	7.64	0.32	18 c
NSL 95218	1.91	0.79	17ab	not included in analyses			
A 8300	2.08	0.74	18ab	PI 198415	1.00	---	1
NSL 93284	2.11	0.86	19ab	PI 546455	3.00	0.58	3

[1] Means followed by the same letter are not significantly different (SNK, p=0.05)

It should be noted that greenhouse screening experiments are rather robust, and give empirical results because variation is reduced to a minimum and the aphid populations are confined to small masses of soil. In the field, sugarbeet root aphid densities may be lower than that observed in the greenhouse. If evaluated in the field, some additional entries may show resistance to sugarbeet root aphids.

Graphical representation of damage ratings for 1999 sugarbeet entries screened for resistance to sugarbeet root aphids.



1999 CGC Evaluations of NPGS PIs for Resistance to Sugar Beet Root Maggot

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The sugar beet root maggot (SBRM), *Tetanops myopaeformis* Roder continues to be the most significant economic insect pest of sugar beets in the Red River Valley growing region of North Dakota and Minnesota. Currently, the most common management tactics involve planting-time and postemergence insecticides. The development of resistant sugar beet varieties would provide a safe and environmentally compatible SBRM management alternative. Furthermore, an additional non-chemical option would serve to delay or prevent the development of insect resistance to insecticides. Thus, this project is carried out on an annual basis to screen the world *Beta* germplasm collection for resistance to SBRM feeding injury.

Materials and Methods:

A commercial field site near St. Thomas, in northeastern North Dakota, was selected for the 1999 *Beta* germplasm trial due to consistently high SBRM populations in the vicinity. Forty entries (treatments) were planted on 17 May into single-row plots (22-inch row spacing) that were 35 ft in length. Experimental design was a randomized complete block with four replications of treatments. Thirty lines for this trial were obtained from USDA-ARS NPGS *Beta* collection (courtesy of Dr. Alan Hodgdon, USDA-ARS Pullman, WA). An additional 9 lines were obtained from Dr. Larry Campbell for either a second year of evaluation or as part of Dr. Campbell's *Beta* breeding program. A commercial variety (Maribo 9363) was included as a susceptible standard. Plant stand counts (density per 35 feet of row) were carried out 24 June. On 2 and 3 August, 10 beets per plot were washed, examined for maggot feeding injury, and rated on a 0 to 9 scale (0 = no damage and 9 = 3/4 or more of root surface blackened by feeding scars). Damage rating and plant stand data were subjected to analysis of variance (ANOVA) and means were compared using the least significant difference (LSD) test.

Results:

Sugar beet root maggot population levels in the northern Red River Valley of North Dakota and Minnesota were severe during the 1999 growing season. Sticky-stake fly monitoring carried out throughout the fly emergence period resulted in the capture of over 3600 flies using 8 stakes. Plant stand counts were very low for the majority of this experiment. An average of only 19 surviving plants per 35 ft of row were recorded for Maribo 9363, whereas, the same variety had a mean density of 44.5 plants during 1998. Low stand counts were largely due to severe SBRM larval feeding injury that often caused the severing of sugar beet tap roots and eventual plant mortality. The lowest SBRM feeding injury rating (2.7) was recorded for PI_269308. Additionally, damage ratings recorded in the PI_379097 and PI_181718 plots averaged 3.2 and 3.5, respectively, and were not significantly ($P > 0.05$) different from PI_269308. The injury ratings for these 3 treatments were significantly ($P < 0.05$) superior to all except one of the remaining 37 treatments. Other entries sustaining

comparatively low SBRM feeding injury included PI_193458 and Yellow. The entry that resulted in the best combination of a low feeding injury rating and high surviving plant stand was PI_181718. Interestingly, PI_504199, PI_605413, PI_179176, PI_504171, PI_518320, and PI_277270 produced the highest plant stands in this experiment but also sustained substantial larval feeding injury (5.63, 5.5, 6.63, 5.83, 5.43, and 6.15, respectively). Our findings may suggest some degree of tolerance to SBRM feeding injury in one or more of the aforementioned entries. However, further study on these materials will be necessary to confirm these findings. Also, future work will hopefully assist in isolating individual lines that may warrant inclusion in traditional breeding programs or possibly biotechnological research for host plant resistance to the sugar beet root maggot.

Root injury and plant stands from evaluation of sugar beet lines for resistance to sugar beet root maggot feeding injury, St. Thomas, ND 1999.

Entry	Injury Rating[a]	Plant stand/(35 feet)
PI_269308	2.70 m	18.50 e-k
PI_379097	3.20 m	18.50 e-k
PI_181718	3.50 lm	23.75 b-e
PI_193458	4.05 kl	18.50 e-k
Yellow	4.53 jk	19.00 e-k
PI_608437	5.20 ij	22.75 b-f
PI_120690	5.23 ij	12.25 lm
PI_222234	5.35 hi	20.50 e-h
PI_518320	5.43 g-i	27.00 a-c
PI_605413	5.50 g-i	31.25 a
PI_171516	5.53 f-i	13.50 i-m
PI_408965	5.60 f-i	16.25 g-l
PI_271441	5.63 f-i	19.50 e-i
PI_504199	5.63 f-i	32.35 a
PI_442069	5.73 e-i	15.00 h-l
PI_116808	5.78 d-i	18.25 e-l
PI_504171	5.83 c-i	27.25 a-c
PI_117115	5.83 c-i	14.75 h-m
PI_120701	5.85 c-i	18.25 e-l
PI_546422	5.88 c-i	13.50 i-m
Maribo 9363	5.88 c-i	19.00 e-k
PI_504180	5.90 c-i	18.25 e-l

Root injury and plant stands from evaluation of sugar beet lines for resistance to sugar beet root maggot feeding injury, St. Thomas, ND 1999.		
Entry	**Injury Rating[a]**	**Plant stand/(35 feet)**
PI_173841	6.05 b-h	24.00 b-e
PI_142810	6.08 b-h	13.00 k-m
PI_164172	6.10 b-h	14.00 i-m
PI_540560	6.13 b-h	21.25 c-g
PI_277270	6.15 b-h	26.50 a-d
PI_268365	6.20 b-g	20.25 e-h
PI_172734	6.23 b-g	13.50 i-m
PI_221436	6.23 b-g	18.50 e-k
PI_504173	6.33 a-f	18.25 e-l
PI_174060	6.33 a-f	17.50 f-l
Ames 8300	6.48 a-e	14.50 h-m
NSL 95218	6.53 a-e	18.00 e-l
NSL 93284	6.53 a-e	13.25 j-m
PI_535818	6.55 a-d	15.75 g-l
PI_173843	6.58 a-d	19.25 e-j
PI_179176	6.63 a-c	27.75 ab
PI_486357	6.85 ab	8.75 mn
PI_518303	7.08 a	4.25 n
Means within a column sharing a letter are not significantly ($P > 0.05$) different (LSD).		
[a]Ratings are based on a 0 to 9 scale with a 0 rating being no visible damage and a 9 indicating severe injury.		

1999 CGC Evaluations of NPGS PI Fusarium and Aphanomyces Root Rots

Dr. C. Rush
Texas A&M Research and Extension Center, Bushland, TX

Weather and field conditions were such in 1999 that it was not possible to get accurate data on the reaction of the Plant Introductions to a field challenge by Fusarium and Aphanomyces.

Appendix 3

Agenda – Crop Germplasm Committee Chairs Meeting July 19 -20, 2000

CROP GERMPLASM COMMITTEES

An Advisory Component of the NPGS

Rationale - Responsibilities - Organization

by Dr. Alan Stoner

Crop Germplasm Committee Chairs Meeting July 19 -20, 2000
George Washington Carver Center - Room 4-2223

Wednesday July 19, 2000 - 1:00 - 5:00 p.m.

Welcome - Judy St John, ARS, Beltsville, MD

Role of CGCs - Allan Stoner, ARS, Beltsville, MD

NPGS Status Report and ARS National Program 301 - Peter Bretting, ARS, Beltsville, MD

International Issues Impacting Access to and Exchange of Germplasm - Barbara Tobias, U.S. Department of State, Washington, DC

Intellectual Property Rights Issues Relative to USDA Genetic Resources Collections - Dick Parry, ARS, Washington, DC

Status of ASTA Initiative to Secure Additional Funding for the NPGS - Kellye Eversole, Eversole Associates, Chevy Chase, MD and Dean Urmston, American Seed Trade Association, Washington, DC

Funding for Plant Exploration and Germplasm Evaluation - Karen Williams and Peter Bretting, ARS, Beltsville, MD

GRIN - Status and Future Plans, Data Issues - Jimmie Mowder and Mark Bohning, ARS, Beltsville, MD

Thursday July 20, 2000 - 8:00 - 12:00 a.m.

Development of Regional Germplasm Networks in South and Central America - David Williams, International Plant Genetic Resources Institute, Cali, Colombia

Methods for Locating Genetic Diversity Using Geographic Information Systems - Luigi Guarino, International Plant Genetic Resources Institute, Cali, Columbia

An Integrated System to Assist in Identifying Germplasm Needs - Robert Webster, ARS, Beltsville, MD

Germplasm Enhancement of Maize - Linda Pollack, ARS, Ames, IA

Utilization of Germplasm in a Soybean Breeding Program - Randy Nelson, ARS, Urbana, IL and Tommy Carter, ARS, Raleigh, NC

Economic Analysis of the Contribution of Germplasm in a Successful Breeding Program, Soybean as an Example - Armineh Zohrabian, Auburn University & Kelly Day-Rubenstein, Economic Research Service, Washington, DC

CROP GERMPLASM COMMITTEES
An Advisory Component of the NPGS
Rationale - Responsibilities - Organization

American agriculture is of vital importance to the nation's welfare. In agriculture, production of most key food, feed, fuel and fiber crops, and research relating thereto, generally is commodity oriented. Germplasm resources and their conservation and use, in turn, appear most effectively considered on a crop by crop basis.

Research and development efforts on crop germplasm involve collective support from Federal and State agencies and private industry. The efforts of each are difficult to delimit. There is a continuum from the utilization of germplasm in agriculture back through seed production, breeding, enhancement, evaluation, preservation, and the collection of germplasm resources. On the two extremes the collection and preservation of basic germplasm stocks is mainly supported by federal funds while the production and delivery of commercial seed or planting stock to the grower is largely in the hands of private industry.

Crop germplasm committees are needed to provide sound information and authoritative recommendations regarding the conservation and use of germplasm of specific crops. Selection for membership on a crop germplasm committee carries with it both national and professional prestige as recognized by the competence required, importance of issues considered, influence on research, and support of germplasm activities.

A. Definition and Name

Crop Germplasm Committee (CGC) is a generic name for a specific national working group of specialist providing analysis, data, and advice about germplasm within a specific crop or group of related crops of present or future economic importance.

Each Committee will be named for the crop or group of crops which it serves. For example, in wheat the committee name would be "Wheat Crop Germplasm Committee".

B. Function

The function of CGC's is to serve their crop commodity groups and provide expert advice to individuals or organizations such as the Agricultural Research Service (ARS), State Agricultural Experiment Stations (SAES), and others on technical matters relating to plant germplasm, its collection and preservation, its enhancement and effective utilization.

C. Duties and Responsibilities

1. Develop and provide a strategic overview of the total national scientific effort in the study of and utilization of germplasm of specific crops or group of crops and recommend cooperative approaches for improvements in the germplasm management system where needs are apparent.

2. Assess the adequacy of the germplasm base for a specified crop or group of crops and make recommendations to appropriate governmental and private agencies for broadening and strengthening each base via additional exploration collection, acquisition of private collections and evaluation.

3. Assess progress in each crop through breeding and the role germplasm resources might play in improving traits of economic importance.

4. Suggest guidelines for the effective regeneration, increase, distribution, evaluation and utilization of plant introductions and other accessions in each crop or group of crops.

5. Consider needs for fundamental and applied studies on each crop and make suggestions on promising research approaches and enhancement opportunities.

6. Assess the impact of biotechnology and genetic engineering on germplasm resource needs and utilization in their respective crops.

7. Monitor staffing and support requirements for research effort relating to plant germplasm activities on individual crops, or groups of crops, and provide suggestions for training, staffing, and support needs.

8. Develop a better understanding of international germplasm activities on the crop(s) in question, identifying and describing implications for science and agriculture in the United States or in those institutions abroad that receive major support from this country.

9. Provide means for commodity groups to voice opinions on need for plant germplasm resources, their improvement and utilization to those individuals responsible for these areas at the national level.

10. Assist variety review boards with respect to new variety developments and breeding progress in their respective crops.

11. Encourage the development and utilization of newsletters and/or reports giving a description of germplasm available for their crops.

12. Develop concise reports when requested on ongoing germplasm activities, resource needs, and action plans for each crop or group of crops.

D. <u>Formation</u>

1. Crop Germplasm Committees will be formed in the U.S. for specific crops or a group of crops important or potentially important to U.S. agriculture. While some crops will be grouped, no limits will be placed upon the number of advisory committees or the crops they represent.

2. Whenever possible, a CGC should have its origin in an existing national crop improvement conference or association.

3. The ARS National Germplasm Resources Laboratory, Beltsville, Maryland, will assist in the formation, direction, and maintenance of Crop Germplasm Committees.

4. Crop Germplasm Committees will be permanent advisory committees subject to periodic review of need.

E. Membership

1. Membership on specific Crop Germplasm Committees shall include scientists who are knowledgeable about germplasm activities relating to that specific crop or group of crops with representation from, but not limited to, SAES, ARS, and private industry.

2. Membership shall provide representation from various scientific disciplines most pertinent to germplasm activities of each crop or group of crops, and geographical representation related especially to commodity culture shall be observed.

3. The number of members on each Germplasm Committee will be unspecified although it is anticipated that 10 to 15 or less should suffice.

4. Selection of scientists to serve on Crop Germplasm Committees should be the function of each respective crop commodity group with ARS, SAES, and private industry being encouraged to recommend persons for membership.

5. Each committee shall have a chairperson, selected with special care, who is a recognized national scientist and authority for the crop or group of crops in question. Place of employment shall not be a determining factor in chairperson selection.

6. Tenure and rotation of members and committee leadership shall be determined by members of each individual Crop Germplasm Committee. Since committee membership is based primarily on expertise, long tenures are expected. However, where equivalent expertise exists, rotation of membership is encouraged through individual terms of 4 to 6 years.

7. Crop-specific curators and ARS National Program Leaders will serve as ex-officio members of Crop Germplasm Committees. Others such as research leaders of sites where the germplasm is managed; personnel at the National Germplasm Resources Laboratory; the National Seed Storage Laboratory; and the Plant Germplasm Quarantine Office will be ex-officio members when determined appropriate by the CGC.

F. Working Relationships

1. Crop Germplasm Committees will be sanctioned by and represent their respective commodity research groups, such as the North American Alfalfa Improvement Conference or Sorghum Improvement Conference of North America, where such exist, as an action committee on germplasm concerns.

2. The Research Leader, National Germplasm Resources Laboratory, through his office will coordinate activities of each committee, maintain a register of their membership, assist in the organization of new germplasm committees, help develop guidelines for their operations, and otherwise assist the committees in the execution of their responsibilities.

3. The Committees will serve primarily their respective crop commodity groups, the USDA, National Association State Universities and Land Grant Colleges and other national organizations, as appropriate, and make recommendations on national programs and needs relating to plant germplasm of specific crops.

4. The Committees are encouraged to work with curators, Plant Introduction Station regional coordinators, and the ARS National Program Leader for plant germplasm on matters relating to the introduction, evaluation, preservation, utilization and dissemination of germplasm.

5. The Committees are encouraged to work with appropriate National Program Leaders, ARS, on matters relating to improvement and use of plant germplasm.

6. The Committees will be free to meet, study issues, make recommendations, and be engaged in other germplasm activities relating to their specific crop or crops.

7. Each Committee will plan its own meeting and activities, but whenever feasible should meet with their respective commodity research conference.

G. Support

1. To the extent possible, the National Germplasm Resources Laboratory will provide administrative assistance and secretariat-type support for Crop Germplasm Committees.

2. The ARS curators and the National Program Leaders will provide guidance and assistance to the CGC's.

3. Committee members are expected to use support available to them through their own organization for committee activities and meetings and are subject to rules and administrative procedures of their respective organizations on receiving funds for travel and attendance at committee meetings.